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Telephone triage of young adults with chest pain: population analysis of NHS 24 calls in Scottish unscheduled care.

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Abstract

Background: Telephone triage is increasingly used to manage unscheduled care demand. Younger adults are frequent users, and commonly call with chest pain. We compared pathways of care in younger adults calling with chest pain, and associations of patient characteristics and telephone triage recommendation with hospital admission.

Methods: A retrospective study of all triage-calls with chest pain to NHS24 advice line by people aged 15-34 between 1/1/15 and 31/12/17 where chest pain was recorded as the call reason. Recommended outcome and subsequent use of services was determined using the Continuous-Urgent-Care-Pathways (CUPs) database which records single episodes of care spanning multiple services. We determined the number of services involved, the proportion of patients with inpatient admission, those with an admission for an 'acute-and-serious' diagnosis, and the association between the triage-call recommendation and these outcomes.

Results: There were 102,822 CUPs identified, with 1251 different combinations of services. The most common pathway was an NHS24 call then attendance at a Primary-Care-Out-of-Hours centre, accounting for 38,643 (37.6%) CUPs. 9060 (8.8%) CUPs ended with hospital admission, 2975 (2.9%) the result of an 'acute-and-serious' diagnosis. 8453 (8.2%) were given 'self-care' advice and not referred further, while 46.9% ended at PCOOH and 15.2% at ED. "Asthma, unspecified" was the most frequent 'acute-and-serious' diagnosis. Compared to people given self-care advice, referral to other services had increased odds of inpatient admission (adjusted odds ratio for ambulance called 28.7, 95%CI 22.6-36.3; for 1-hour in-home GP visit arranged aOR 36.8, 95%CI 23.2-58.5) and for admission with an 'acute-and-serious' diagnosis (aOR ambulance called 23.9, 95%CI 16.2-35.4; aOR 1-hour GP visit 48.3, 95%CI 25.5-91.6).

Conclusion: Chest pain triage by NHS24 appears safe, but care pathways can involve multiple service contacts. Whilst acuity assigned to the call is strongly related to the odds of hospital admission and odds of an 'acute-and-serious' diagnosis, 'over-triage' means few patients are directed to self-care advice.

Key messages

What is already known on this subject

- The unscheduled and emergency care system in the UK consists of a number of different, interlinked services. The use of all services is increasing.
- The recommended access to unscheduled care in the UK is via a single telephone point of access, NHS111 (NHS24 in Scotland), which triages access to other services. Evidence as to the effectiveness of this form of triage is lacking.
- Chest pain is a common reason for young adults to contact NHS 24.

What this study adds

- In this retrospective study of calls to NHS24 in Scotland, 1 in 40 calls are by young people aged 15-34 with chest pain.
- NHS24 triage of undifferentiated chest pain in young adults identified 8.2% as safe to 'self-care', and not requiring onward referral. 8.8% of contacts ended with an inpatient hospital admission.
- Unscheduled care pathways and service interactions are complex, with 1251 different pathways identified in this study.

Introduction

Use of unscheduled care is increasing worldwide, leading to pressure on healthcare systems and concerns about safety in crowded emergency departments.(1,2) A potential solution is the use of telephone advice lines, whereby trained call-handlers, aided by clinical decision computer software provide advice, and triage those looking to access unscheduled care. Whether this non-clinical, algorithmic assessment of symptoms reliably discriminates severity and need for intervention is uncertain.(3,4)

In the UK unscheduled care refers to any unplanned health contact with the NHS,(5) and includes urgent and emergency care. One suggested cause for increased use of unscheduled care is that easier access has led to more people making contact. (2,6) Increased awareness amongst the public of serious conditions may also contribute, in the context of patient difficulty in knowing when symptoms are 'urgent' (not life-threatening but too serious to wait for a routine appointment). (7,8,9)

NHS 111 (NHS24 in Scotland) is a key gateway by which urgent care services are accessed in the UK, with open access by dialing 111. It offers both health advice and triage. (9) NHS24 calls are taken by trained call-handlers supported by a Clinical Decision Support System (NHS Pathways). Based on what the patient says, the call-handler's choice of symptom triggers an NHS Pathways algorithm prompting further questions, in turn leading to advice on appropriate disposition. The call-handler is not focused on formulating a differential diagnosis but instead on identifying key symptoms, the algorithm determines the nature and type of subsequent questions.

The term 'triage' originated in the battlefield, where the wounded were prioritised for treatment based on the likelihood of death if not dealt with promptly. (10) In unscheduled care, triage is about identifying symptoms requiring a time-critical intervention. Chest pain is often difficult to triage, most causes are not serious, but a minority of people have conditions requiring rapid treatment to minimise the risk of death or significant morbidity. Understanding NHS24 management and outcomes for callers with chest pain is important to evaluate safety and effectiveness of unscheduled care telephone triage.

A prior analysis of calls made to NHS24 in 2011 found 15-34 year olds were the largest number of contacts of any age group (26.9% of the total). Chest pain was the third most common reason to call with over 25,000 calls (after abdominal and dental problems). (11) In this group, the total number of

deaths from cardiovascular-respiratory causes was 84, compared to 3,870 deaths in the 65-74 age-group. (3) Chest pain is therefore a common concern in younger people with high workload implications, yet few, but still serious, critical events. (12,13)

This study aimed to assess the effectiveness of telephone triage in the UK in identifying patients needing urgent attention - by examining pathways of care and hospital admission outcomes in a young adult population calling NHS24 with chest pain.

Methods

Study design and data sources

The design was a retrospective, population study using the Scotland-wide Urgent-Care-Datamart (UCD) which links data from NHS24, the Scottish Ambulance Service, Primary-Care-Out-of-Hours (PCOOH), Emergency Departments, acute hospital admissions (Scottish Morbidity Records 01 [SMR01]), mental health admissions (SMR04), and National Records Scotland death registration. The Community Health Index (CHI - the NHS Scotland unique patient identifier) number was used to link all datasets. Linkage was carried out by NHS Scotland Information Services Division Scotland. Data on contacts is electronically collected by all services and is complete. (14) A Continuous-Urgent-Care-Pathway (CUP) is a series of unscheduled care contacts for a single person. (14) CUPs terminate when there is no further contact with any unscheduled care service for 24 hours. Each emergency and urgent care service is assigned a code letter: N=NHS24, O=Primary-Care-Out-of-Hours, S=Scottish-Ambulance-Service, E=Emergency Department, A=Acute hospital emergency-admission, M=mental health non-respite admission. CUP names are the chronological sequence of contacts. For example, CUP NSEA represents an NHS 24 call, followed by Scottish Ambulance Service call, Emergency Department attendance and finally Acute hospital emergency admission (figure 1).

Setting and patients

The cohort consisted of all callers aged 15-34 years to NHS24 between 1/1/15-31/12/17 with 'chest pain' recorded as the call reason. Call reasons do not discriminate between types of chest pain; including traumatic and non-traumatic causes. Demographic information, NHS24 call recommendation (the action recommended to the patient or taken by NHS24), the CUP pathway, discharge diagnosis if admitted (categorised using ICD-10 codes), and mortality data were extracted for all eligible patients.

Outcomes

Mortality in the seven days after the ending of each CUP was examined, including cause of death. For patients given self-care advice, the number subsequently admitted over seven days was examined, including discharge diagnoses. Two outcomes were examined: (1) acute inpatient admission, and (2) acute inpatient admission with an 'acute-and-serious' disease defined as discharge diagnosis of a condition requiring urgent treatment. Both were examined in association with NHS24 call recommendation (Appendix 1 and 2).

Independent variables

Other variables examined were age, sex, socioeconomic status (defined by the Scottish Index of Multiple Deprivation [SIMD] grouped into quintiles), urban/rurality (defined by the Scottish Executive Urban Rural Classification [SEURC] grouped into primary city/urban, accessible, remote and very remote, where the latter three categories are defined by drive time to an urban area of <30 minutes, 30-60 minutes, >60 minutes respectively).

NHS24 call recommendation (the action recommended to the patient or taken by NHS24) was defined based on the records whether the caller was discharged with advice or referred to another service and, for some referral services, the time within which the caller should be seen. Recommendation was categorised as self-care advice; emergency ambulance; self-transport to the emergency department; general practitioner home-visit within one-hour, two-hours, or four-hours; Primary-care-out-of-hours (PCOOH) attendance within one-hour, two-hours, or four-hours; or patient to make a scheduled appointment later.

Data Analysis

Data were managed and analysed using Excel, R and SPSS. Demographics, mortality and cause of death were described using summary statistics. Pathways between initial NHS24 contact and the final outcomes (discharge or admission) were described. For the binary outcome variables (admitted, and admitted with an 'acute and serious diagnosis'), logistic regression modelling examined associations between outcomes and NHS24 initial disposition, gender, age group, SIMD and SEURC.

Patient and public involvement

No patient or public involvement.

Ethics and governance

The NHS Scotland Public Benefit and Privacy Panel for Health and Social Care approved the project (reference 1617/0307).

Results

Demographics of callers

Between 2015-2017, 102,822 CUPs were initiated by calls where chest pain was the recorded call reason, in callers aged 15-34 (table 1), constituting 10.4% of 991,036 calls to NHS24 in this age group, and 2.5% of all 4,033,935 calls across all age groups. 36.9% of these were male, 63.1% female. 35.1% of calls were made by people living in the most deprived quintile of postcodes, with a stepwise decrease to 10.6% from people living in the least deprived quintile.

NHS24 call outcome recommendations

In total 26,151 (25.4%) of calls were considered not requiring an urgent care need, with 17,698 (17.2%) advised to attend an in-hours service the next working day and 8,453 (8.2%) advised self-care (table 2 and figure 2). Most commonly recommended was referral to PCOOH with 53,619 calls (52.1%). 6,091 (5.9%) calls ended with advice to self-transport to ED, and 11,758 (11.4%) were advised to call an emergency ambulance.

The most common pathway within a CUP was an NHS24 call followed by attendance at PCOOH (NO), 37.6% of all CUPs (table 1). Second most frequent was a single call to NHS24 (N - 23.7%) with no further attendance, and third an NHS24 call followed by an ED attendance (NE - 6.5%). 1254 different CUP combinations were identified, the longest consisting of 62 service contacts (table 1). 9060 calls (8.8%) were part of a CUP ending in an acute hospital admission, with 3080 (3.0%) having an acute and serious diagnosis. Of those advised to seek care at another service within 24 hours, 18.7% did not. Of those who were advised to self-care, 10.6% attended another service within 24 hours. Amongst callers advised to attend ED, 19.9% did not attend (Figure 1 and appendix 3). Self-care advice was recommended for 8453 (8.2%) of CUPs, and 73 (0.9%) of these patients were subsequently admitted to hospital within the duration of the CUP.

In both univariate and adjusted analysis, all NHS24 recommendations were strongly associated with increased odds of admission compared to self-care advice (table 2 and figure 2). In adjusted analysis,

NHS24 referral to Scottish Ambulance Service was associated with a higher odds of admission (OR 28.7, 95%CI 22.6-36.3) compared to self-care advice, than those told to self-transport to the ED (OR 17.8, 95%CI 14.0-22.7). Referral for a GP home-visit was associated with higher odds of admission than those referred to the PCOOH centre, with increased odds for more urgent referrals (compared to self-care advice, OR 36.8, 95%CI 23.2-58.5) for home-visit in one-hour vs 36.8 (95%CI 26.3-48.9) for two-hours, vs 19.0 (95%CI 14.1-25.5) for four-hours; OR 18.5 (95%CI 14.5-23.6) for PCOOH attendance in one-hour, vs 15.4 (95%CI 12.1-19.5) for two-hours, vs 7.9 (95%CI 6.2-10.0) for four-hours). Compared to self-care advice, scheduled appointments were associated with the lowest odds of admission to hospital (OR 5.5, 95%CI 4.3-7.0). Weak but statistically significant associations were noted between odds of admission and increasing age (OR 1.3, 95%CI 1.2-1.4) and increasing socioeconomic deprivation (OR 1.3, 95%CI 1.2-1.4) (table 2).

Clinical Outcomes

For the 9,060 CUPs that ended with acute inpatient admission, 834 different ICD-10 codes were recorded across 18 ICD-10 chapters^a. The most frequently assigned ICD-10 code was “chest pain, unspecified” in 7.2% of admissions, followed by “asthma, unspecified” in 7.1% and “other chest pain” in 6.3%. Of the 3080 CUPs ending in admission with an ‘acute-and-serious’ diagnosis, the most frequently assigned ICD-10 code was “asthma, unspecified” accounting for 653 (21.2%), whereas an acute myocardial infarction was diagnosed in 0.1% and cardiac arrhythmia in 0.4%.

580 patients were admitted to critical care: 95 (0.9%) to the intensive care unit, 311 (3.1%) to the high dependency unit and 174 (1.7%) to coronary care (appendix 1). The most frequently coded diagnosis was “Type 1 diabetes mellitus with ketoacidosis” accounting for 99 cases followed by “asthma unspecified” accounting for 50 cases (appendix 1).

In total 99 (0.1%) patients who were given self-care advice were admitted in the 7 days following the ending of their initial CUP, 27 (0.3%) of these with an ‘acute-and-serious’ diagnosis. Although, compared with self-care advice, all other NHS 24 recommendations had a higher odds of admission (table 3 and figure 2). In univariate and adjusted analysis where the outcome was an admission with an ‘acute-and-serious’ diagnosis, attendance by ambulance was associated with a higher odds of such a diagnosis than referred to self-transport to the Emergency Department (OR 23.9(16.2-35.4) vs OR 14.7 (9.8-22.1)) (table 3 and figure 2). Home-visits were associated with the greatest odds of serious diagnosis. In addition, there was a positive association with the level of urgency assigned

^a Data relating to ICD10 codes available on request.

(one-hour HV OR 48.3 (25.5-91.6) vs two-hour OR 39.5 (24.5-63.6) vs four-hour OR 14.4 (8.7-23.7)). A positive association between urgency linked with a PCOOH attendance and odds of serious diagnosis was also observed (one-hour PCOOH attendance OR 20.3 (13.6-30.4) vs two-hour OR 17.3 (11.7-25.8) vs four-hour OR 6.4 (4.3-6.5)). There was an association between SIMD and odds of admission, with those in the most deprived quintile being most likely to be admitted to hospital. The question as to whether remoteness of the caller, in terms of drive time to reach an urban centre, has an influence on the odd of admission or, odds of a serious diagnosis, was examined but no association was found.

24 (0.03%) patients died within seven days of the end of a chest pain CUP (appendix 2). No deaths occurred in patients who had been given self-care advice by NHS24 and two occurred in those advised to attend a scheduled service.

Discussion

Chest pain represents a symptom of significant concern for young people, accounting for 102,822 calls to NHS24 over a three-year period (one in forty of all calls). Nearly 9% of these calls are part of a series of unscheduled care contacts that end with an inpatient admission, although many admissions end with a non-specific diagnosis. Calls were more common from young adults living in more deprived areas, with those living in more deprived areas more likely to be admitted to hospital than those living in more affluent areas.

NHS24 triage to self-care was effective in identifying people at very low risk of admission (although only 8.2% of calls were triaged to this recommendation). A further 17.2% were referred to in-hours care reducing pressure on other unscheduled care services. There were clear gradients in the odds of admission in relation to the urgency of other NHS24 recommendations, in terms of the service referred to, and the recommended time to respond for GP home-visits and PCOOH attendances. Although two deaths within seven days of first contact were observed in the 17,698 people given advice to attend scheduled services, none were observed in the 8,543 given self-care advice. Finally, the wide range of diagnoses associated with an initial presenting symptom of chest pain highlights the challenges faced in first-contact triage of undifferentiated symptoms.

The key strength of the study is that the Urgent Care Datamart allows for a comprehensive analysis of linked unscheduled care attendances for the entire Scottish population. Limitations include that we cannot be certain that linked episodes in a CUP are actually for the same problem, since CUPs are defined as sequential episodes over a short period of time - a patient advised to 'self-care' who subsequently re-attends within 24 hours, with or without the same symptom, will still be included. Information pertaining to the content of CUPs was complete but there was missing data with respect to NHS24 call recommendation. A further weakness is that CUPs are for episodes linked over a 24-hour period, so a related call with a longer gap will not be linked. In addition, the selection of calls was determined by the call-handler's interpretation of the patient's symptoms triggering the use of the chest pain algorithm, which may mean that some 'chest pain' presentations are not included if another algorithm was used. Finally, we have limited information about the caller's background health status, so it is unclear the extent to which admissions are for new chest pain or relate to an underlying illness presenting acutely-

The overall number of callers with chest pain is consistent with previous research, as is the finding that the majority of young adult callers with chest pain are women.(2) Work on referral outcomes in all age-groups in NHS111 in England has found similar proportions requiring ambulance but a higher proportion referred to self-transport to ED (12.8% vs 5.9% in this study).(12) Asthma accounted for 7.9% (718) of admissions in the period studied, a small minority of approximately 1500 acute annual admissions with asthma in Scotland for the same age group in 2016.(13) An acute myocardial infarction was diagnosed in 0.1% of admitted patients and cardiac arrhythmia in 0.4%. Data from surveys of the general population in the United States has estimated the prevalence of myocardial infarction in the 20-39 age group at 0.3% for both men and women. (15) Studies of primary care patients with undifferentiated chest pain have estimated coronary artery disease to be the underlying aetiology in 2-3%. (16,17)

Even in this young age-group, a significant proportion of those presenting to NHS24 telephone triage are considered in need of hospital admission by a GP or ED doctor, or have an 'acute-and-serious' final diagnosis. Assessment by NHS24 call-handlers appears safe and reliable when assessing the urgency of undifferentiated chest pain presentations in younger patients. However, safety relies on rapid access to other services, both PCOOH and ED, whose workload is affected by NHS24 triage. NHS24 triage for further urgent assessment had a sensitivity of 89.8% for admission in the same CUP, with a positive-predictive-value of 10.9% (appendix 3). Research to improve PPV without compromising sensitivity is important. A deeper understanding of care pathways that involve

multiple service contacts is required, as is an understanding of pathways where there is divergence from NHS24 advice. This knowledge may help reduce service contact, thereby minimizing duplication of assessment and social contact, a key benefit in the current Covid-19 pandemic.

The pandemic may have a long-lasting impact on how we access medical care, with longer-term effort to minimise crowding in waiting rooms. Within the NHS, the “Think 111” campaign is encouraging the public to use 111 as a single point of access for all unscheduled care services. The question of whether it triages as effectively across different age groups and for different presenting symptoms is an area for future research, as is the impact it has on safety and patient flow to other services. Comparing the cohort who phone NHS24 with those that self-present to ED and to PCOOH would allow further examination as to whether initial telephone triage could be a permanent solution for those attempting to access unscheduled care, irrespective of service, thereby minimising the total number of social contacts.

Whether all 9060 inpatient admissions in this cohort are actually required is a topic for future research, since there may be opportunities for more effective triage in PCOOH and the emergency department. Furthermore, the underlying health issues of those presenting with chest pain requires closer examination, particularly those triaged to GP home visit who had the highest probability of admission. Further study may allow for preventative measures and additional support for those with underlying health issues that necessitate a home visit in the first instance.

Conclusion

This study found that chest pain in young adults accounts for a significant number of contacts with NHS24, resulting in a complex variety of different care pathways, and that nearly 10 percent of such contacts ended with an admission to hospital. NHS24 triage appeared effective, in that the level of acuity assigned to the outcome of the initial NHS24 contact was very strongly related to the odds of admission to hospital, and the odds of the patient having a diagnosis requiring timely medical intervention.

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Ethics approval: Public Benefit and Privacy Panel for Health and Social Care approval was granted to the project (reference 1617/0307).

Provenance and peer review: Not commissioned; externally peer reviewed.

Data availability statement: Unable to share data. Access requires permission from the Public Benefit and Privacy Panel for Health and Social Care (HSC-PBPP).

Table 1: Characteristics of young adult Continuous Unscheduled Care Pathways starting with an NHS24 call for chest pain

	All young adult chest pain CUPs (n=102 822) Number (%)
Sex of caller	
Men	37971 (36.9)
Women	64845 (63.1)
Age group of caller	
15-19	20133 (19.6)
20-24	31130 (30.3)
25-29	27959 (27.2)
30-34	23598 (23.0)
SIMD quintile of caller ^a	
1 (highest deprivation)	36063 (35.1)
2	24538 (23.9)
3	17690 (17.2)
4	13208 (12.8)
5 (lowest deprivation)	10871 (10.6)
Remoteness of caller ^b	
Urban	81237 (79.0)
Accessible	15925 (15.5)
Remote	3494 (3.4)
Very Remote	1714 (1.7)
CUPS with >2% frequency	
NO ^c	38643 (37.6)
N	24378 (23.7)
NE	6659 (6.5)
NSE	5188 (5.0)
NOO	2906 (2.8)
NS	2846 (2.8)
NNO	2265 (2.2)
NSEA	2248 (2.2)
Final service contact in CUP	
PCOOH ^d (O)	48224 (46.9)
NHS 24 (N)	26560 (25.8)
Emergency Department (E)	15658 (15.2)
Admission (A)	9060 (8.8)
Ambulance (S)	3232 (3.1)
Mental health admission (M)	88 (0.1)
Number of service contacts in CUP	
1	24378 (23.7)
2	49521 (48.2)
3	17836 (17.3)
4	7599 (7.4)
5 or more	2063 (2.1)
Most service contacts in a single CUP	62
Number of different CUP combinations	1251

a. SIMD: Scottish Index of Multiple Deprivation

b. Measured by Scottish Executive Urban Rural Classification. Accessible = within 30 minute's drive time of an urban area; Remote = 30-60 minute's drive time from an urban area; Very remote = >60 minute's drive time from an urban area

c. N = NHS24, O = GPOOH, E = Emergency Department, S = Scottish Ambulance Service, A = Acute inpatient admission.

d. Primary care out of hours

Table 2: Odds ratio and adjusted odds ratio for all admissions

	No. with outcome (%)	Univariate OR (95%CI)	Adjusted OR (95%CI)
NHS 24 disposition (N)			
Self-care advice (8453)	73 (0.9)	Reference	Reference
Ambulance called (11758)	2422 (20.6)	29.7 (23.6-37.7)	28.7 (22.6-36.3)
Emergency Department (6091)	825 (13.5)	18.0 (14.1-22.9)	17.8 (14.0-22.7)
1-hour GP home visit (130)	32 (24.6)	37.5 (23.6-59.4)	36.8 (23.2- 58.5)
2-hour GP home visit (498)	122 (24.5)	37.2 (27.4- 50.7)	35.9 (26.3-48.9)
4-hour GP home visit (928)	137 (14.8)	19.9 (14.8- 26.7)	19.0 (14.1-25.5)
1-hour PCOOH ^a appt (5697)	800 (14.0)	18.8 (14.7-23.9)	18.5 (14.5-23.6)
2-hour PCOOH appt (8390)	998 (11.9)	15.5 (12.2-19.7)	15.4 (12.1-19.5)
4-hour PCOOH appt (37976)	2475 (6.5)	8.0 (6.3-10.1)	7.9 (6.2-10.0)
Scheduled appt (17698)	811 (4.6)	5.5 (4.3-7.0)	5.5 (4.3-7.0)
Sex of caller			
Men	3420 (9.0)	Reference	
Women	5640 (8.7)	1.04 (0.99-1.09)	
Age group of caller			
15-19	1556 (7.7)	Reference	Reference
20-24	2352 (7.6)	1.0 (0.9-1.04)	1.0 (0.9-1.1)
25-29	2582 (9.2)	1.2 (1.1-1.3)	1.1 (1.1- 1.2)
30-34	2570 (10.9)	(1.4-1.6)	1.3 (1.2-1.4)
SIMD quintile ^b of caller			
5 (lowest deprivation)	771 (7.1)	Reference	Reference
4	1076 (8.1)	1.2 (1.1-1.3)	1.1 (1.03-1.3)
3	1528 (8.6)	1.2 (1.1-1.4)	1.2 (1.1-1.3)
2	2122 (8.6)	1.2 (1.1-1.4)	1.2 (1.1-1.3)
1 (highest deprivation)	3512 (7.1)	1.4 (1.3-1.5)	1.3 (1.2-1.4)
Remoteness ^c of caller			
Urban	7054 (8.7)	Reference	
Accessible	1471 (9.2)	1.1 (1.0-1.1)	
Remote	337 (9.6)	1.1 (1.0-1.3)	
Very Remote	147 (8.6)	1.0 (0.9-1.2)	

a. Primary care out of hours

b. SIMD: Scottish Index of Multiple Deprivation

c. Measured by Scottish Executive Urban Rural Classification. Accessible = within 30 minutes drive time of an urban area; Remote = 30-60 minutes drive time from an urban area; Very remote = >60 minutes drive time from an urban area

Table 3: Odds ratio and adjusted odds ratio for a final diagnosis of acute and serious disease.

	No. with outcome (%)	Univariate OR (95%CI)	Adjusted OR (95%CI)
NHS 24 disposition (N)			
Self-care advice (8453)	27 (0.3)	Reference	Reference
Ambulance called (11758)	821 (7.0)	23.4 (15.6-34.4)	23.9 (16.2-35.4)
Emergency Department (6091)	267 (4.4)	14.3 (9.6-21.3)	14.7 (9.8-22.1)
1-hour GP home visit (130)	17 (13.1)	46.9 (24.9-88.6)	48.3 (25.5-91.6)
2-hour GP home visit (498)	54 (10.8)	37.9 (23.7-60.8)	39.5 (24.5-63.6)
4-hour GP home visit (928)	40 (4.3)	14.1 (8.6-23.0)	14.4 (8.7-23.7)
1-hour PCOOH appt (5697)	338 (5.9)	19.7 (13.3-29.2)	20.3 (13.6-30.4)
2-hour PCOOH appt (8390)	426 (5.1)	16.7 (11.3-24.7)	17.3 (11.7-25.8)
4-hour PCOOH appt (37976)	735 (1.9)	6.2 (4.2-9.1)	6.4 (4.3-9.5)
Scheduled appt (17698)	250 (1.4)	4.5 (3.0-6.7)	4.6 (3.1-6.9)
Sex			
Men	1229 (3.2)	Reference	Reference
Women	1851 (2.9)	1.14 (1.1-1.2)	1.1 (1.0-1.2)
Age group			
15-19	557 (2.8)	Reference	-
20-24	844 (2.7)	0.9 (0.9-1.1)	
25-29	842 (3.0)	1.1 (0.9-1.2)	
30-34	837 (3.5)	1.3 (1.2-1.4)	
SIMD quintile ^a			
1 (highest deprivation)	1127 (3.1)	Reference	Reference
2	768 (3.1)	1.2 (1.1-1.4)	1.2 (1.02-1.3)
3	546 (3.1)	1.2 (1.1-1.4)	1.2 (1.02-1.4)
4	350 (2.6)	1.2 (1.1-1.4)	1.2 (1.02-1.4)
5 (lowest deprivation)	275 (2.5)	1.1 (0.9-1.2)	1.04 (0.9-1.2)
Remoteness ^b			
Urban	2386 (2.9)	Reference	-
Accessible	514 (3.2)	1.1 (1.0-1.2)	
Remote	118 (3.4)	1.2 (0.9-1.4)	
Very remote	48 (2.8)	0.9 (0.7-1.3)	

a. SIMD: Scottish Index of Multiple Deprivation

b. Measured by Scottish Executive Urban Rural Classification. Accessible = within 30 minutes drive time of an urban area; Remote = 30-60 minutes drive time from an urban area; Very remote = >60 minutes drive time from an urban area

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